

Inventor: HALL ET AL  
 Serial No.: 09/889,370  
 Filing Date: 07/17/2001  
 Examiner: KERNS, Kevin P.  
 Group Art Unit: 1726

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1-32 (cancelled)

33. (new) A reactor for processing a gaseous medium, said reactor including a reactor bed and at least two electrodes, conduits for constraining a gaseous medium to flow through said reactor bed, a power supply unit connected to said reactor bed for generating and applying a potential across said reactor bed for exciting an electric discharge in said gaseous medium as it flows through said reactor bed, wherein said reactor is a dielectric barrier discharge reactor wherein at least one of said electrodes has a dielectric barrier coating applied thereto, said reactor bed and said power supply unit being located adjacent to each other and enclosed in an electrically conductive enclosure that is maintained at ground potential, and means for electrically connecting said reactor bed and said power supply unit directly together.

34. (new) A reactor according to claim 33, wherein said reactor bed comprises reactor bed material, said potential being

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applied across said reactor bed by said electrodes being in contact with said reactor bed material, and at least one side of said electrodes having a coating of dielectric material coated thereon.

35. (new) A reactor according to claim 17 wherein said reactor bed is comprised of a cylindrical body of gas permeable dielectric material contained between an inner, concentric, gas permeable electrode and an outer, concentric, gas permeable electrode, said outer, concentric, gas permeable electrode being connected directly to ground and said inner, concentric, gas permeable electrode being connected directly to said power supply unit, and said conduits directing said gaseous medium to pass radially through said cylindrical body of gas permeable dielectric material.

36. (new) A reactor according to claim 33, wherein said reactor bed consists of a cylindrical body of gas permeable dielectric material contained between an outer, non-permeable electrode and an inner, non-permeable electrode, said outer electrode being connected to ground and said inner electrode being connected directly to said power supply unit, and said conduits constraining said gaseous medium to flow axially through said cylindrical body.

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37. (new) A reactor according to claim 33, wherein said reactor bed is comprised of gas permeable dielectric material in the form of spheres, pellets, extrudates, fibers, sheets, coils, granules, wafers, meshes, frits, foams, honeycomb monolith or membrane, or combinations with one or more of the above forms.

38. (new) A reactor according to claim 33, wherein said power supply unit comprises means for producing a pulsed, or alternating, output voltage.

39. (new) A reactor according to claim 33, wherein said electrodes and said power supply unit form an electrical circuit having a resonant frequency, said power supply unit having an output voltage having a frequency, and means for making said resonant frequency of said electrical circuit substantially equal to said frequency of said output voltage from said power supply unit.

40. (new) A reactor according to claim 39, wherein said means for making said resonant frequency of said electrical circuit including said electrodes substantially equal to that of said output voltage from said power supply unit is comprised of an appropriate inductance means connected in parallel with said electrical circuit.

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41. (new) A reactor according to claim 39, wherein said power supply unit includes an output for generating a voltage of the order of tens of kilovolts at a frequency within the range of 50 Hz to 15 kHz.

42. (new) A reactor according to claim 33 including means for incorporating said reactor into an exhaust system of an internal combustion engine.

43. (new) A reactor according to claim 42, including a step-up transformer having primary windings and secondary windings, an ac generator connected to said primary windings, said ac generator having an output frequency, said internal combustion engine having a variable rotational speed, and means for maintaining said output frequency at a pre-determined value regardless of variations in said rotational speed of said internal combustion engine in the exhaust system of which said reactor is incorporated.

44. (new) A reactor processing a gaseous medium, said reactor including a reactor bed, at least two electrodes, conduits for constraining a gaseous medium to flow through said reactor bed, a power supply unit for generating and applying an electric potential across said reactor bed for exciting an

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electric discharge in said gaseous medium as it flows through said reactor bed, said reactor comprising a dielectric barrier discharge reactor wherein at least one of said electrodes has a dielectric barrier coating coated thereon, said reactor bed and said power supply unit being located adjacent to each other and connected directly together electrically, said reactor and said power supply unit forming an electrical circuit, said electrical circuit having a resonant frequency and said power supply unit having an output voltage which has a frequency, and means for making said resonant frequency substantially equal to the frequency of said output voltage from said power supply unit, said reactor being adapted for incorporation into an exhaust system of a variable speed, internal combustion, engine; a step-up transformer having primary windings and secondary windings, an ac generator connected to said primary windings, said ac generator having an output frequency, means for maintaining said output frequency at a pre-determined value regardless of variations in the variable speed of said internal combustion engine in the exhaust system of which the reactor is incorporated, and wherein said engine includes drive means for driving said ac generator at a constant speed.

45. (new) A reactor according to claim 44, wherein said drive means comprises a hydraulic drive unit having a drive

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efficiency which varies inversely with the speed of said engine.

46. (new) A reactor according to claim 44, wherein said drive means comprises a stepless, variable speed, transmission system having an effective gear ratio which varies inversely with the speed of said engine.

47. (new) A reactor according to claim 44, wherein said drive means includes an electromagnetic clutch having a drive efficiency which varies inversely with the speed of said engine.